METHOD FOR HEATING OR COOLING FLUID MEDIUM

TECHNICAL FIELD

[0001] This invention relates to the sphere of heating engineering especially to various systems operated with heated or cooled fluid or gaseous mediums, e.g. heating systems, ventilation or conditioning units in industrial and domestic compartments.

BACKGROUND ART

[0002] There is an air cooling method performed by an air-conditioning system in transport cabs and cabins (see Certificate of authorship USSR, No. 688351, 30.09.1979). The air-conditioning system consists of a thermoelectric generator connected to a DC network, a filter-ventilation system, a liquid thermal conduction module, integrated with radiation – convection panels. Radiation surfaces of these panels are directed to the pilot place, at that the adverse side of the panels has a thermal contact with thermoelectric batteries. Panels are equipped with inner air channels and connected to collectors with discharge cocks. This appliance can be operated in aeration, radiation, radiant, radiation-convection cooling or heating modes. During partially heat sinking from hot junctions of the thermal battery, it can also be attempered with air, cooled down lower than a dew-point. That allows increasing considerately the air conditioning efficiency and - in the event of heat air attack to the cabin - to assuring comfortable conditions due to complex influence on the air inside the cabin.

[0003] However, this method of the air heating and cooling has low power efficiency and is also remarkable for high power consumption for air conditioning; all these facts restrict wide application of air-conditioning systems as a universal cabin aeration unit.

[0004] Mostly near to the technical essence and achieved results of this invention stands a liquid medium heating or cooling method, which stipulates supply of the heated or cooled liquid medium into a flowing channel and its further heating or cooling on at least two stages (see Patent RF 2140365, cl. F 25 B 29/00, 27.10.1999).

[0005] This liquid medium heating or cooling method allows considerately increasing the heating or resp. cooling efficiency of the liquid medium due to a stage-by-stage treatment of the medium. However, this method does not ensure a high efficiency in energy conversion during heating or cooling that occurs because of unavailability of an optimal algorithm of the liquid medium heating or cooling processes.

DISCLOSURE OF INVENTION

[0006] This invention is developed to get the maximum efficiency of the liquid medium heating and cooling processes at minimum power consumption provided by application of two or more staged cold and heat generators.

[0007] This liquid medium heating or cooling method includes such procedures as supply of the cooled or heated liquid medium into a flowing channel and its further heating or cooling on at least two stages. At that the flowing channel is divided into two stages of cooling and heating, both of the equal length, whereas a temperature of each stage – towards from the first to the next one in spurts and in direct proportion – is getting higher by heating or respectively is getting lower by cooling. At that, a cooled or a heated liquid medium is pumped into a flowing channel tangentially angle-wise towards generating ray of the flowing channel on the liquid medium inlet at a temperature of 45°C to 90°C.

[0008] By analyzing different types of the liquid medium cooling or heating appliance, one can mention, that the way of interaction between the heated and

the cooled mediums exerts a big influence on the heat transmission efficiency. The heat exchanging rationally arranged improving overall dimensions of the liquid medium heating or cooling appliances as well as reducing considerably the energy necessary for the heating or cooling. Liquid medium heating or cooling stages performed with an equal length at relatively spurted temperature changes of the heating or cooling stage allows maintaining along the channel a relatively equal temperature difference between a heating or cooling source and a liquid medium. Within turbulization of the liquid medium flow - by spinning at the flowing channel inlet – it also let equalize the temperature of the liquid medium in cross-section by generous and consistent heating or cooling.

BRIEF DESCRIPTION OF DRAWINGS

[0009] FIG.1 sketchy shows a cross-section of an appliance model, preformed the above mentioned method of the liquid medium heating or cooling.

[0010] FIG. 2 shows a profile of A-A on the Fig. 1.

[0011] The liquid medium heating or cooling appliance consists of a flowing channel 1, along which stages 2 of equal length are provided from its outer side for cooling down or warming up the liquid medium (gas or liquid) which flows inside the channel 1. Above mentioned stages 2 can be made as a jacket around of the flowing channel 1, which with a outer wall of the flowing channel 1 creates a cavity, to which an agent (heating agent or refrigerant) is pumped or they can be performed, for instance, as thermoelectric batteries mounted on the outer surface of the flowing channel 1. At that these thermoelectric batteries are connected to the power network so that they create stages of the equal length, to which a power is supplied, increasing from one stage to an other in direct proportion and in spurts. Respectively, heat carrier (heating agent or refrigerant, e.g. alcohol, Freon or liquid ammonia) is pumped into the jackets a.m.; temperature of this heat carrier

is increasing or falling down stage by stage and in direct proportion. As an example, a heat carrier can be pumped into the jackets or (in the case with thermoelectric batteries) first stage can be tempered to 14 °C, the second one to 28°C and the third to 42°C. The heat carrier with the temperature required can be obtained and supplied by a vapor compression machine. Such a machine can be applied to heat a liquid medium as well as to cool it down. At that, the jackets – in one case – creating cavities around the flowing channel 1, act as a condenser, in other case they serve for an evaporator of the vapor compressor machine. The liquid medium enters the flowing channel 1 tangentially through a jet or a nipple 3 (the last is better). At that the jet or the nipple 3 are mounted ά-angle-wise towards generating ray of the flowing channel 1 on the liquid medium inlet at a temperature of 45°C to 90 °C.

BEST MODE FOR CARRYING OUT THE INVENTION

[0012] This method of the liquid medium heating or cooling is described below.

[0013] The liquid medium (heat or cold) enters the flowing channel 1 through a jet or a nipple 3. In the flowing channel 1 a successive heating or cooling of the liquid medium takes place on two stages 2 at least. Temperature of each stage 2 (from the first one to the next) is rising in spurts and in direct proportion in the case of heating or is falling down in the case of cooling. As a result, a successive heating or cooling of the liquid medium takes place in the flowing channel 1.

[0014] By applying thermoelectric batteries, they are connected to the DC network via a control panel, which allow to change polarity of the voltage supplied, it also let change operating modes of the batteries: to heat or to cool down the liquid medium in the flowing channel 1. It is possible, if necessary, to perform the

heating or cooling stages divided forward the liquid medium for two heat insulated from each other stages of heating or cooling. In this case, a different working voltage is supplied, as described above, to the thermoelectric batteries. At that the voltage on the batteries of the second and all the next stages exceeds voltage on the batteries of the first stage in direct proportion.

INDUSTRIAL APPLICABILITY

[0015] The above mentioned liquid medium heating or cooling method ensures an effective cooling or heating of gas or liquid, it can be applied in oil-refining industry, e.g., by the heat treatment of the liquefied gases in oil and petrochemical industries, in order to cool down a slop or for instance a margarine emulsion, as well as in air-conditioning systems for air heating or cooling.